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(54) ENGINE INTAKE DEVICE WITH SUPERCHARGER

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(72) Inventor Shigeru SAKURAI
c/o Toyo Industry Co., Ltd.
3-1 Shinchi, Fuchū-chō
Aki-gun, Hiroshima-ken

(72) Inventor Hiroyuki ODA
c/o Toyo Industry Co., Ltd.
3-1 Shinchi, Fuchū-chō
Aki-gun, Hiroshima-ken

(72) Inventor Haruo OKIMOTO
c/o Toyo Industry Co., Ltd.
3-1 Shinchi, Fuchū-chō
Aki-gun, Hiroshima-ken

(72) Inventor Haruhiko SATŌ
c/o Toyo Industry Co., Ltd.
3-1 Shinchi, Fuchū-chō
Aki-gun, Hiroshima-ken

(71) Assignee Toyo Industry Co., Ltd.
3-1 Shinchi, Fuchū-chō
Aki-gun, Hiroshima-ken

(72) Representative Attorney Kiyoichi TANAKA

SPECIFICATION

1. Title of the Invention
ENGINE INTAKE DEVICE WITH SUPERCHARGER
2. Scope of Patent Claims
(1) An engine intake device with a supercharger, characterized in that – in an engine with a supercharger that is provided with an auxiliary intake system in addition to the primary intake system, and where the supercharger is provided in the aforementioned auxiliary intake system, and new air is supplied from the primary intake system below the established load of the engine, and that is configured such that it provides supercharged air from the auxiliary intake system in at least the compression stroke in addition to the new air from the primary intake system at the established load of the engine or higher – it is provided with a control device that controls an auxiliary intake valve that comprises the aforementioned auxiliary intake system so that its lift is increased according to the increase of the load in the supercharging range.
3. Detailed Description of the Invention
The present invention relates to an engine intake device with a supercharger.

Conventionally, an engine with a supercharger that is provided with an auxiliary intake system equipped with a supercharger in addition to the primary intake system that supplies new air by means of the negative pressure of the engine intake, that supplies new air from the primary intake system below the established load of the engine, and that is configured such that it provides supercharged air from the auxiliary intake system in at least the compression stroke in addition to the new air from the primary intake system at the established load of the engine or higher is well-known as one kind of engine with a supercharger as shown in Japanese Unexamined Patent Application Publication S55–137314, for example.

However, in the aforementioned engine, there is the inconvenience that in the initial stage of the supercharging range where the charging pressure is low, the compression pressure decreases and the output becomes insufficient.

In other words, in the initial stage of the supercharging range where the non-supercharged range switches over to the supercharged range and supercharged air begins to be supplied from the auxiliary intake system, the charging pressure gradually falls below the objective of supplying supercharged air, and it has been equipped such that the charging pressure increases according to the increased load. Meanwhile, the auxiliary intake valve of the auxiliary intake system closes after the primary intake valve of the primary intake system in the compression stroke closes, and the lift is set to be large corresponding to the charging pressure at the time of maximum charging. Thus, when the charging pressure is low, because a portion of the pressurized gas within the combustion chamber is blown back and flows into the auxiliary intake system before the auxiliary intake valve closes in the compression stroke, the increase in the compression pressure becomes insufficient, and it has not be possible to achieve the desired output performance (the supercharging effect).

In consideration of such points, the present invention provides an engine intake device with a supercharger that is configured with a control device provided that controls an auxiliary intake valve that comprises the auxiliary intake system so that its lift is increased according to the increase of the load in the supercharging range, and prevents the blowing back of the pressurized gas at the initial stage of the supercharging range, and exercises the desired supercharging effect by means of the primary intake system and the auxiliary intake system.

Below, an example of embodiment of the present inventions shall be explained in reference to the figures. In Figure 1, 1 is the engine, 2 is the primary intake system that provides new air to the engine 1 via the primary intake port 4 that communicates with the combustion chamber 3 of the cylinder head 1a of the aforementioned engine 1, and similarly, 5 is the auxiliary intake system that provides supercharged air to engine 1 via auxiliary intake port 6 that communicates with the combustion chamber 3, and similarly, 7 is an exhaust system that expels exhaust gas from the engine 1 via the exhaust port 8 that communicates with the combustion chamber 3.

In the primary intake system 2, 9 is a primary intake valve that opens and closes the primary intake port 4 with the desired timing, 10 is a primary throttle valve that controls the inspiratory airflow that is provided along the primary intake passage 11, 12 is a fuel injection nozzle that injects fuel upstream of the primary throttle valve 10, and 13 is an injection control device that controls the amount of fuel injected.

The aforementioned injection control device 13 is configured so as to receive an intake volume signal detected by means of the airflow meter 14 and a rev count signal detected by means of a revolution sensor 15, calculate the fuel injection amount according to the operating conditions of engine 1 from these signals, send a control signal to the fuel injection nozzle 12, and have a prescribed amount of fuel injected into the primary intake system 2.

In the auxiliary intake system 5, 16 is an auxiliary intake valve that opens and closes auxiliary intake port 6 with the desired timing (see Figure 3) by means of the timing cam 17, 18 is a supercharger composed of a vane type engine pump that is provided along the auxiliary intake passage 19, and in addition, 20 is an auxiliary throttle valve that is provided at the auxiliary intake passage 19 downstream of the supercharger 18, the aforementioned auxiliary throttle valve 20 is linked with the aforementioned primary throttle valve 10 via a linking mechanism, etc., and the primary throttle valve 10 is linked to open to a desired aperture or more and moved in a linked fashion in order for it to open from the closed state.

The aforementioned supercharger 18 is driven via an electromagnetic clutch 21 by means of the engine 1. That is to say, the driving force of the crankshaft 24 that is rotary driven via the connecting rod 23 reciprocally to the piston 22 in the engine 1 is conveyed via the drive assembly 25 causing supercharger 18 to be rotary driven, and the driving and pausing of the supercharger 18 is controlled by means of the disengagement and engagement of the electromagnetic clutch 21.

The aforementioned electromagnetic clutch 21 is configured such that it disengages and engages according to the load of the engine 1, and the signal from the aperture sensor 26, which detects the openness of the auxiliary throttle valve 20, is input into this electromagnetic clutch 21, and when the auxiliary throttle valve 20 has been opened to a set value or higher, in other words, when the load of engine 1 is of a set value or higher, the electromagnetic clutch 21 engages and drives the supercharger 18.

Moreover, 27 is a relief passage that bypasses the aforementioned supercharger 18, 28 is a relief valve provided at the aforementioned relief passage 27, and this regulates the upper limit of the charging pressure force downstream of the supercharger 18.

In addition, in the exhaust system 7, 29 is the exhaust valve that opens and closes the exhaust port 8 at a desired timing, and 30 is the exhaust passage that connects with the exhaust port 8.

Regarding the relation of the timing of the opening and closing of the aforementioned primary intake valve 9 and the auxiliary intake valve 16, as illustrated in Figure 3, the auxiliary intake valve 16 remains open from the final stage of the intake stroke through the compression stroke, and closes at a timing that is later than the that of the primary intake valve 9, and it supplies supercharged air from auxiliary intake system 5 at least in this compression stroke.

Meanwhile, in Figure 1, 31 is a control device that controls an auxiliary intake valve 16 so that its lift is increased according to the increase of the load in the supercharging range, and detecting the charging pressure of the auxiliary intake passage 19 and adjusting them timing cam 17, the lift of auxiliary intake valve 16 is as shown in Figure 3, and as the charging pressure (the load) increases, it increases the lift so that the open valve curve changes from A to B or C.

In Figure 2, a specific example of the aforementioned control device 31 is shown where one end of a rocker arm 33 that is supported by rocker shaft 32 such that it can rock freely is linked to the auxiliary intake valve 16, and a roller 34 is provided on the other end. Meanwhile, timing cam 17 is configured such that it is fitted to rock freely in the direction of the shaft via the splines 36 on camshaft 35, and the cam surface 17a of the aforementioned timing cam 17 is established diagonally to the direction of the rocking, and the roller 34 of the aforementioned rocker arm 33 is pressure welded to this cam surface 17a, and the rocker arm 33 rocks according to the revolution of the timing cam 17. In addition, the lever 38a of the actuator 38 is engaged in the groove 17b of the timing cam 17, and the timing cam 17 is rocked by means of the action of the aforementioned actuator 38. As for the aforementioned actuator 38, it is configured such that the rear anchor of rod 38b that is affixed to the front end of the aforementioned lever 38a is supported by a diaphragm 38c, and while the charging pressure in the auxiliary intake passage 19 downstream from auxiliary throttle valve 20 is introduced into the pressure chamber 38d that is partitioned by the aforementioned diaphragm 38c, the compression spring 38f is compressed at the atmospheric chamber 38e, the diaphragm 38c is displaced according to the charging pressure that is introduced into the pressure chamber 38d, and the timing cam is rocked. Furthermore, 39 is a spring retainer for auxiliary intake valve 16.

Next, to explain the operation of the aforementioned example of embodiment, first, when the load is low and the aperture of primary throttle valve 10 is at a set value or below, the auxiliary throttle valve 20 is closed, the electromagnetic clutch 21 is in a disengaged state, and the supercharger 18 is not being driven, and new air is supplied to the combustion chamber 3 only from the primary intake system with the natural indraft.

At that time, the influx of the pressurized gas (the fuel) into the supercharger 18 is prevented by the closure of the auxiliary throttle valve 20, and moreover, the lift of the auxiliary intake valve 16 is small, and the valve opening-area is in a restricted state, and furthermore, it closes quickly, and so the amount of pressurized gas to blow back into the auxiliary intake passage 19 between the auxiliary intake valve 16 and the auxiliary throttle valve 20 is small, and the reduction of the compression pressure is prevented. Furthermore, when not supercharged as described above, it is preferable to have the auxiliary intake valve 16 in the closed state and the lift reduced to zero.

When the load of engine 1 increases and the primary throttle valve opens beyond a set value, the auxiliary throttle valve 20 begins to open in tandem, the electromagnetic clutch 21 enters into the engaged state due to the signal from the aperture sensor 26 and the supercharger 18 is driven, and by this means supercharged air is supplied from the auxiliary intake system 5 to the combustion chamber 3 in addition to the new air from the primary intake system 2. The charging pressure at the auxiliary intake passage 19 downstream from the auxiliary throttle valve 20 rises along with the increase in the load of the engine 1 and the opening of the auxiliary throttle valve 20 that results from it.

This charging pressure is introduced into the compression chamber 38d of the actuator 38 at the control device 31, and the diaphragm 38c presses against the compression spring 38f and is displaced according to the size of the charging pressure, and this rocks the timing cam 17 in the direction of the shaft via the lever 38a, the contact position of the cam surface 17a changes in relation to the roller 34 of the rocker arm 33, and this increases the rocking of the rocker arm 33 so that the lift of the auxiliary intake valve 16 increases.

Thus, at the initial stage of the supercharging range, the charging pressure is low, but because the lift of the auxiliary intake valve 16 is also low, even if the compression pressure rises above the charging pressure just before the auxiliary intake valve 16 closes, the amount of compressed gas that is blown back into the auxiliary intake passage 19 is small. Meanwhile, as the charging pressure rises, the lift of the auxiliary intake valve 16 rises accordingly, and so it continues to prevent the blowing back of the pressurized gas, and a sufficient amount of charging pressure is supplied to the combustion chamber 3.

Moreover, the charging pressure is low during the transition where the non-supercharged range switches over to the supercharged range, and moreover, blowback does not occur, and so the charging pressure is supplied gradually, there is no sudden change in output, and shock to the engine 1 is prevented.

Furthermore, in the aforementioned example of embodiment, in addition to the lift of the auxiliary intake valve 16 produced by the control device 31, it also changes the timing of valve opening and the timing of valve closing, and even if only the lift of the auxiliary intake valve 16 is reduced and the and the valve opening-area is in a restricted state, it is possible to prevent the pressurized gas from blowing back, and so it has an effect even if only the lift is increased or decreased, but in addition to this it speeds up the timing of the valve closing, and by this means it is possible to achieve and addition effect of preventing blowback, and so it is preferable. Also, in addition to the diaphragm system it is acceptable to employ a hydraulic pressure system as the actuator 38, and regarding load detection as well, in addition to the charging pressure it is also acceptable to detect it from the aperture of the auxiliary throttle valve 20.

Also, in the aforementioned example of embodiment, fuel is only supplied to the primary intake system 2, but it is also acceptable to have fuel supplied to the auxiliary intake system 5 in addition to the primary intake system 2, and furthermore, it is also acceptable to employ a fuel supply device that uses a carburetor instead of the fuel injection nozzle 12.

Moreover, regarding the operation of the supercharger 18, it is driven by the engine 1, but it is also acceptable to have it driven using an electric motor, and in addition, the supercharger 18 is driven and paused by means of the electromagnetic clutch 21, but it is also acceptable to have it driven constantly and control the relief amount, and on the other hand, the control of the aforementioned electromagnetic clutch 21 can be performed employing any kind of signal that changes according to the load of the engine 1 such as intake negative pressure and without using the aperture sensor 26 of the auxiliary throttle valve 20.

Accordingly, by means of the present invention as described above, in an engine with a supercharger that is provided with a primary intake system and an auxiliary intake system, by establishing a control device that controls an auxiliary intake valve so that its lift is increased according to the increase of the load in the supercharging range, it is possible to reduce the lift of the auxiliary intake valve in the initial stage of the supercharging range where the charging pressure is low and to prevent the pressurized gas from blowing back into the auxiliary intake passage, and while it exercises the initial supercharging effect by preventing a decrease of compression pressure and by means of the primary intake system and the auxiliary intake system, it is also possible to prevent shock to the engine during the transition where the non-supercharged range switches over to the supercharged range.

4. Brief Description of the Drawings

The figures show one example of embodiment of the present invention, and Figure 1 is an overall block diagram of the engine with a supercharger, Figure 2 is a structural diagram that shows a specific example of the control device, and Figure 3 is a curve chart showing the timing of the opening and closing of the valves.

1 ... engine, 2 ... primary intake system, 5 ... auxiliary intake system, 11 ... primary intake passage, 16 ... auxiliary intake valve, 17 ... timing cam, 18 ... supercharger, 19 ... auxiliary intake passage, 31 ... control device, 32 ... rocker shaft, 33 ... rocker arm, 35 ... camshaft, 38 ... actuator.

Patent Assignee Toyo Industry Co., Ltd.
RepresentativeAttorney Kiyoichi TANAKA
[seal: Seal of Representative Kiyoichi Tanaka]

FIGURE 1

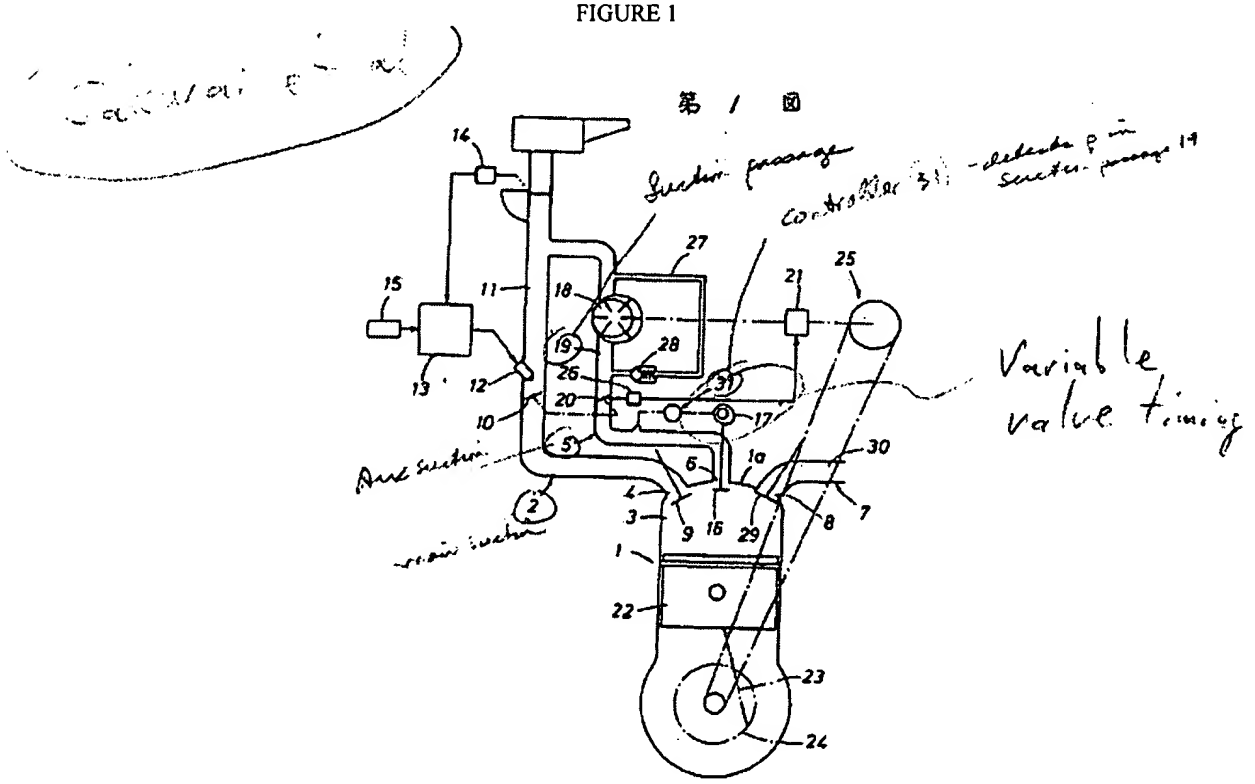


FIGURE 2

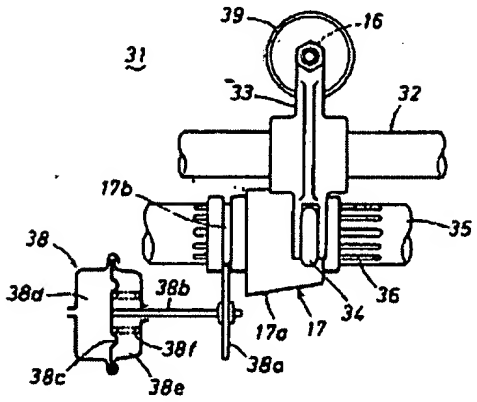
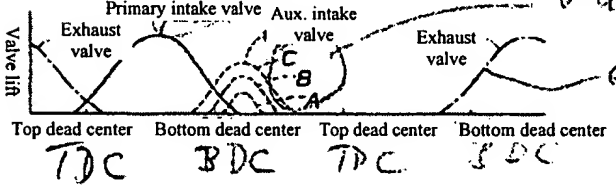


FIGURE 3



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INVENTOR-INFORMATION:
NAME
SAKURAI, SHIGERU
ODA, HIROYUKI
OKIMOTO, HARUO
SATO, HARUHIKO

ASSIGNEE-INFORMATION:
NAME COUNTRY
MAZDA MOTOR CORP N/A

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ABSTRACT:

PURPOSE: To prevent a back-flow of a compressed gas in a combustion chamber into an auxiliary suction system at the initial stage within a supercharging range by providing a controller which controls the auxiliary suction valve such that its lift may be increased according to the increase of a load within said range.

CONSTITUTION: In addition to a main suction system 2, an auxiliary suction

system 5 is provided and a supercharger 8 is incorporated therein. A controller 31 detects a supercharged pressure in an auxiliary suction passage 19 and adjusts a timing cam 17 on the basis of the detection for controlling a lift of an auxiliary suction valve 16 to be increased according to the increase of a load in the supercharging range. The controlling that the lift of the auxiliary suction valve 16 is reduced at the initial stage within said range where a supercharged pressure is low may prevent a compressed gas in a combustion chamber from being blown back into the auxiliary suction passage 19.

⑲ 日本国特許庁 (JP)　　⑪ 特許出願公開

⑫ 公開特許公報 (A)　　昭58—62314

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(全 5 頁)

⑭過給機付エンジンの吸気装置

⑳特　　願　昭56—160835
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⑫発 明 者　桜井茂
広島県安芸郡府中町新地 3 番 1 号東洋工業株式会社内
⑫発 明 者　小田博之
広島県安芸郡府中町新地 3 番 1 号東洋工業株式会社内
⑫発 明 者　沖本晴男
広島県安芸郡府中町新地 3 番 1 号東洋工業株式会社内
⑫発 明 者　佐藤東彦
広島県安芸郡府中町新地 3 番 1 号東洋工業株式会社内
⑪出 願 人　東洋工業株式会社
広島県安芸郡府中町新地 3 番 1 号
⑭代 理 人　弁理士　田中清一

明　細　書

1　発明の名称

過給機付エンジンの吸気装置

2　特許請求の範囲

(1)　主吸気系に加えて補助吸気系を設け、該補助吸気系に過給機を設け、エンジンの設定負荷未満で主吸気系から新気を供給し、エンジンの設定負荷以上で主吸気系からの新気に加えて少なくとも圧縮行程において補助吸気系から過給気を供給するようにした過給機付エンジンにおいて、上記補助吸気系を構成する補助吸気弁を、そのリフト量が過給領域において負荷の増大に応じて増大するように制御する制御装置を設けたことを特徴とする過給機付エンジンの吸気装置。

3　発明の詳細な説明

本発明は、過給機付エンジンの吸気装置に関するものである。

従来より、過給機付エンジンの一種として、エンジンの吸気負圧により新気を供給する主吸気系に加えて、過給機を備えた補助吸気系を設け、エンジンの設定負荷未満で上記主吸気系から新気を供給し、エンジンの設定負荷以上で主吸気系からの新気に加えて少なくとも圧縮行程において、補助吸気系から過給気を供給するようにした過給機付エンジンは、例えば特開昭55—137314号に示されるように公知である。

しかしながら、上記エンジンにおいては、過給圧の低い過給領域の初期に圧縮圧力が低下して出力不足となる不具合を有する。

すなわち、非過給領域から過給領域に移行し補助吸気系から過給気を供給し始める過給領域の初期においては、徐々に過給気を供給する目的から過給圧は低く、負荷の上昇に従って過給圧が上昇するように設けられている。一方、補助吸気系の補助吸気弁は圧縮行程において主吸気系の主吸気弁が閉じた後に閉じるとともに、そのリフト量は最大過給時の過給気量に対応して大きく設定されている。よって、過給圧の低いときには、圧縮行程において補助吸気弁が閉じるまでに燃焼室内の

圧縮ガスの一部が補助吸気系に吹き返して流入するために、圧縮圧力の上昇が不充分となって所期の出力性能（過給効果）が得られないものである。

本発明はかかる点に鑑み、補助吸気系を構成する補助吸気弁を、そのリフト量が過給領域において負荷の増大に応じて増大するように制御する制御装置を設けてなる過給機付エンジンの吸気装置を提供し、過給領域初期における圧縮ガスの吹き返しを阻止し、主吸気系と補助吸気系とによる所期の過給効果を発揮させるものである。

以下、本発明の実施例を図面に沿って説明する。第1図において、1はエンジン、2は該エンジン1のシリンダヘッド1aの燃焼室3に開口した主吸気ポート4を介してエンジン1に新気を供給する主吸気系、5は同じく燃焼室3に開口した補助吸気ポート6を介してエンジン1に過給気を供給する補助吸気系、7は同じく燃焼室3に開口した排気ポート8を介してエンジン1からの排気ガスを排出する排気系である。

主吸気系2において、9は主吸気ポート4を所定のタイミングで開閉する主吸気弁、10は主吸気通路11の途中に介設され吸気流量を制御する主絞弁、12は主絞弁10の上流に燃料を噴射する燃料噴射ノズル、13は燃料噴射量を制御する噴射制御装置である。

上記噴射制御装置13は、エアフローメータ14により検出した吸気量信号および回転センサー15により検出したエンジン回転数信号を受け、これらの信号によりエンジン1の運転状態に応じた燃料噴射量を演算し、燃料噴射ノズル12に制御信号を発して所定量の燃料を主吸気系2に噴射せしめるよう構成されている。

補助吸気系5において、16は補助吸気ポート6をタイミングカム17により所定のタイミング（第3図参照）で開閉する補助吸気弁、18は補助吸気通路19の途中に介装されたベーン形のエアポンプよりなる過給機、また、20は過給機18の下流における補助吸気通路19に介設された補助絞弁で、該補助絞弁20は前記主絞弁10とリンク機構等にて連係され、主絞弁10が所定開度以上に開くのに連動して閉鎖状態から開くように連係作動される。

上記過給機18はエンジン1により電磁クラッチ21を介して駆動される。すなわち、エンジン1におけるピストン22の往復動により連接棒23を介して回転駆動されるクランク軸24の駆動力が駆動装置25を介して伝達されることにより過給機18は回転駆動され、電磁クラッチ21の断接操作により過給機18の駆動、停止が制御されるものである。

上記電磁クラッチ21は、エンジン1の負荷に応じて断接されるものであって、この電磁クラッチ21には補助絞弁20の開度を検出する開度センサー26の信号が入力され、補助絞弁20が設定値以上開いたとき、すなわち、エンジン1の負荷が設定値以上のときに電磁クラッチ21が接続状態となって過給機18を駆動するよう構成されている。

さらに、27は上記過給機18をバイパスするリリーフ通路、28は該リリーフ通路27に介設されたリリーフ弁であり、過給機18下流の過給圧力の上限を規制するものである。

また、排気系7において、29は排気ポート8を所定のタイミングで開閉する排気弁、30は排気ポート8に連通する排気通路である。

前記主吸気弁9と補助吸気弁16との開閉時期の関係は第3図に例示するように、補助吸気弁16は吸気行程の終期から圧縮行程にかけて開き、主吸気弁9よりも遅い時期に閉じるものであり、少なくともこの圧縮行程において補助吸気系5から過給気を供給するものである。

一方、第1図において、31は補助吸気弁16のリフト量を過給領域において負荷の増大に応じて増大するように制御する制御装置であって、補助吸気通路19の過給圧を検出してタイミングカム17を調整し、補助吸気弁16のリフト量を第3図に示す如く、過給圧（負荷）が上昇するのに従って開弁曲線がAからBないしCに変化するようにリフト量を増大させるものである。

第2図には上記制御装置31の具体例を示し、

ロッカーシャフト３２に揺動自在に支承されたロッカーアーム３３の一端は補助吸気弁１６に連係され、他端にはローラ３４が設けられている。一方、カムシャフト３５にスプライン３６を介してタイミングカム１７が軸方向に摺動自在に嵌装され、該タイミングカム１７のカム面１７ａは摺動方向に傾斜して設けられており、このカム面17aに前記ロッカーアーム３３のローラ３４が圧接されてタイミングカム１７の回転に応じてロッカーアーム３３が揺動するよう構成されている。また、タイミングカム１７の溝１７ｂにはアクチュエータ３８のレバー３８ａが係合され、該アクチュエータ３８の作用によってタイミングカム１７が摺動される。上記アクチュエータ３８は前記レバー３８ａを先端に固着したロッド３８ｂの基端がダイヤフラム３８ｃで支持され、該ダイヤフラム３８ｃにて区画された圧力室３８ｄには補助絞弁２０下流の補助吸気通路１９における過給圧が導入される一方、大気室３８ｅには圧縮スプリング３８ｆが縮装され、圧力室３８ｄに導入される過給圧に応じてダイヤフラム３８ｃが偏位し、タイミングカム１７を摺動操作するよう構成されている。尚、３９は補助吸気弁１６のスプリングリテーナである。

次に、上記実施例の作用を説明すれば、先ず、主絞弁１０の開度が設定値以下の低負荷時には、補助絞弁２０は閉じており、電磁クラッチ２１は断状態にあって過給機１８は駆動されておらず、主吸気系からのみ新気が自然吸入によって燃焼室３に供給される。

その際、補助絞弁２０の閉鎖により圧縮ガス（燃料）が過給機１８に流入するのが阻止され、さらに、補助吸気弁１６のリフト量は小さく、開口面積は絞られた状態にあり、しかも、早い時期に閉じるので、補助吸気弁１６から補助絞弁２０との間の補助吸気通路１９に吹き返す圧縮ガス量は少なく、圧縮圧力の低下が阻止される。尚、上記のような非過給時には、補助吸気弁１６のリフト量をゼロにして閉弁状態にするのが好ましい。

エンジン１の負荷が上昇して主絞弁１０が設定値を越えて開かれると、これに連動して補助絞弁２０が開き始め、開度センサー２６からの信号により電磁クラッチ２１が接続状態となって過給機１８が駆動されることにより、燃焼室３には主吸気系２からの新気に加えて補助吸気系５から過給気が供給される。この補助絞弁２０下流の補助吸気通路１９における過給圧は、エンジン１の負荷が増大し、これに応じて補助絞弁２０が開くのに従って上昇する。

この過給圧は制御装置３１におけるアクチュエータ３８の圧力室３８ｄに導入され、過給圧の大きさに応じてダイヤフラム３８ｃが圧縮スプリング３８ｆに抗して偏位し、レバー３８ａを介してタイミングカム１７を軸方向に摺動させて、ロッカーアーム３３のローラ３４に対するカム面17aの接触位置を変更し、ロッカーアーム３３の揺動角を大きくして補助吸気弁１６のリフト量を増大するものである。

よって、過給領域の初期には、過給圧は小さいが、補助吸気弁１６のリフト量も小さいことにより、補助吸気弁１６が閉じる直前において圧縮圧力が過給圧より高く上昇しても、補助吸気通路19に吹き返す圧縮ガス量は少ない。一方、過給圧が上昇するのに従って補助吸気弁１６のリフト量が増大することから、圧縮ガスの吹き返しを阻止しつつ充分な過給気が燃焼室３に供給される。

さらに、非過給領域から過給領域へ移行する過渡時には過給圧が低く、しかも吹き返しが生じないために、過給気が徐々に供給され、出力の急変動がなく、エンジン１のショックが防止される。

尚、上記実施例においては、制御装置３１によって補助吸気弁１６のリフト量に加えてその開弁時期および閉弁時期も変更するようにしているが、補助吸気弁１６のリフト量を小さくして開口面積を絞るだけでも圧縮ガスの吹返しが防止できることから、リフト量のみ増減するだけで効果はあるが、これと併せて閉弁時期を早くすることによって一層の吹き返し防止効果が得られるのでより好ましい。また、アクチュエータ３８としてはダイヤフラム方式のほかに油圧方式を採用してもよく、

負荷の検出についても、過給圧のほか補助絞弁20の開度等から検出してもよい。

また、上記実施例では主吸気系2のみに燃料を供給するようにしているが、主吸気系2に加えて補助吸気系5にも燃料を供給するようにしてもよく、また、燃料噴射ノズル12に代えて気化器を使用した燃料供給装置を採用してもよい。

さらに、過給機18の作動については、エンジン1にて駆動するようにしているが、電動モータを使用して駆動するようにしてもよく、また、電磁クラッチ21で過給機18を駆動、停止するようにしているが、常時駆動してリリーフ量を制御するようにしてもよく、一方、上記電磁クラッチ21の制御は補助絞弁20の開度センサー26によらず、吸気負圧等のエンジン1の負荷に応じて変動する各種信号が採用できる。

従って、以上の如き本発明によれば、主吸気系と補助吸気系とを備えた過給機付エンジンにおいて、補助吸気弁のリフト量を過給領域において負荷の増大に応じて増大するように制御する制御装置を設けたことにより、過給圧の低い過給領域初期において補助吸気弁のリフト量を小さくして圧縮ガスの補助吸気通路への吹き返しを防止することができ、圧縮圧力の低下を阻止して主吸気系と補助吸気系とによる初期の過給効果を発揮するとともに、非過給領域から過給領域への過渡時におけるエンジンのショックを防止することができる。

図面の簡単な説明

図面は本発明の一実施例を示し、第1図は過給機付エンジンの全体構成図、第2図は制御装置の具体例を示す機構図、第3図は弁開閉時期を示す曲線図である。

1……エンジン、2……主吸気系、5……補助吸気系、11……主吸気通路、16……補助吸気弁、17……タイミングカム、18……過給機、19……補助吸気通路、31……制御装置、32……ロッカーシャフト、33……ロッカーアーム、35……カムシャフト、38……アクチュエータ。

特許出願人　東洋工業株式会社

代理人　田中清一

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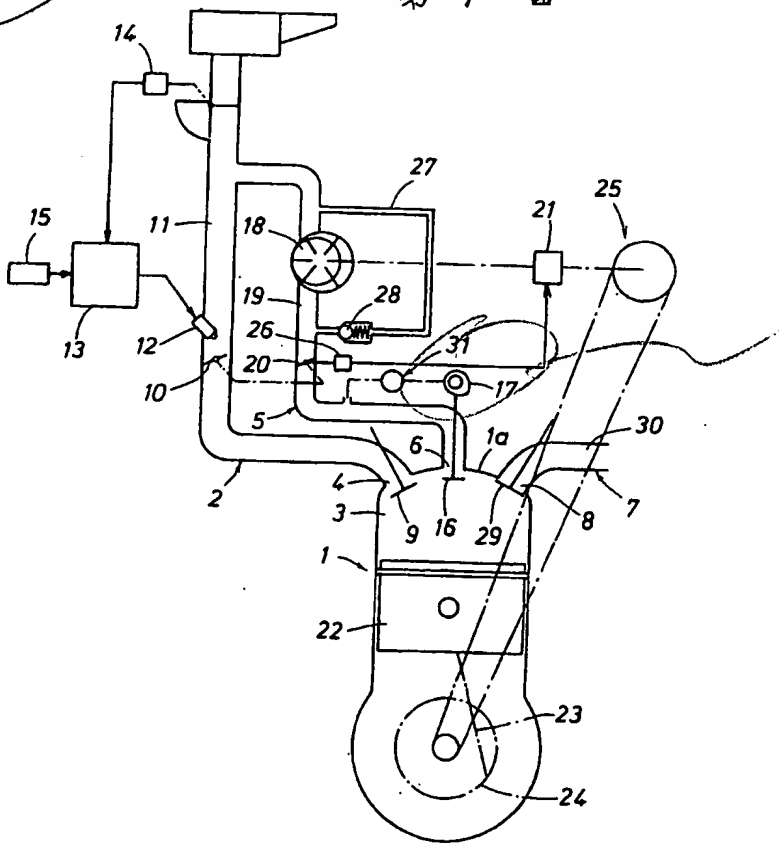
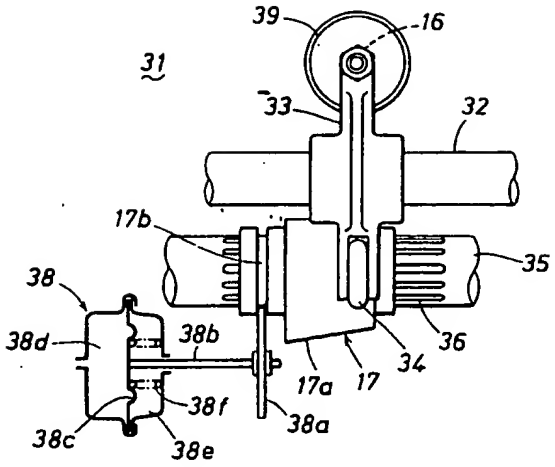
第1図

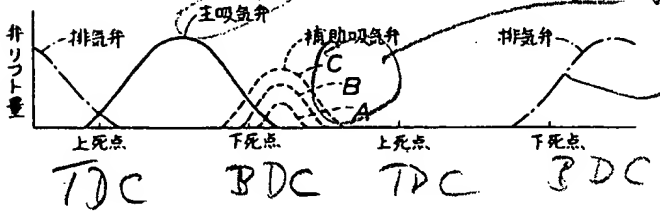


Variable valve timing

第 2 図



第 3 図



Valve 9 (Intake)
Valve 10 (Intake)
exhaust
TDC BDC TDC BDC